

OBITUARY

**Kiyoshi Takewaki (1905–1988)**

Emeritus Professor Kiyoshi Takewaki of the University of Tokyo died at the age of 82 on the 16th of January 1988 after a long period of unconsciousness. His death was due to bronchial pneumonia originating in a traffic accident on the 12th of April 1987. Until the time of accident, Professor Takewaki had been healthy and vigorous. We feel great regret at the loss of this distinguished zoologist as well as an eminent endocrinologist. All that is left to us is to cherish his memory.

Kiyoshi Takewaki was born on the 1st of March 1905 at Toyama City in the middle of the Honshu on the Japan Sea. As a primary school boy, he was watching a water-scorpion in the evening of a summer day, and was deeply impressed by this beautiful scene of nature. He wrote later about this moment of beauty in a book "Mizukamakiri wa tobu (A Water-Scorpion Flies)". This esthetic impression exerted a long-lasting influence on his study and taste. He loved arts and crafts, mainly pictures, and occasionally he himself painted scenes from nature. In research, he maintained his naturalist's mind, being always modest before nature as well as in evaluation of his own results.

In 1922, he entered the Fourth High School, Science Course, at Kanazawa, and finished the Course after 3 years. Before leaving high school, he told his teacher about his choice of future occupation as zoologist. The teacher was greatly astonished at hearing this unexpected idea, because Takewaki always had the best record in the school. After a while, the teacher just said "It's impossible to live that way".

In 1925, he was admitted to the Zoological Institute of the Faculty of Science at the Imperial University of Tokyo. During his university student period, he wrote four short papers based on his observations of insects, although his full-fledged studies did not begin until after his graduation in 1928.

Here, Emeritus Professor Naohide Yatsu of the Imperial University of Tokyo should be mentioned in order to understand why Takewaki began to study endocrinology. Yatsu went to the United States the

year after graduation from the Imperial University (1900) to enter graduate school at Columbia University. He was strongly impressed there by Prof. Jacques Loeb's lectures, and recognized the importance of experimental zoology. After he obtained Ph. D. in 1905, Yatsu moved to the Stazione Zoologica of Naples, then came back to the Imperial University as lecturer (1907), and became associate professor (1909). Yatsu made efforts to develop experimental zoology, but met with stout resistance to his attempted innovation. So, he moved as professor of the Department of Anatomy at Keio University in 1919. However, he was finally called back to be professor at the Imperial University in 1922, where again he began to develop experimental zoology. During a period of "Sturm und Drang" in the Imperial University of Tokyo, Yatsu introduced the technique of parabiosis into experimental zoology in an attempt to elucidate the balance of sex hormones in rats (1916). These efforts marked the commencement of experimental endocrinology in Japan.

In 1928, Takewaki was added as assistant (instructor) at Yatsu's laboratory and first encountered rats and mice as the experimental animals which he used for more than 50 years thereafter. His first study on rats was to examine the state of various blood cells following gonadectomy (1929), but the second study on parabiosis between intact and gonadectomized rats became the origin of his life work on the endocrinology of reproduction (1931). In 1933-1935, his subject of study shifted to the transplanted testis and ovary in intact, senile, unilaterally or bilaterally gonadectomized and cryptorchidized rats. In this period he also published two papers on the state of the testis transplanted into intact and gonadectomized lizards, a pioneer study in comparative endocrinology. He also studied changes in the mouse adrenal glands following treatments with gonadotropic extract from human pregnancy urine.

The influences of castration, hysterectomy, pregnancy, pseudopregnancy and testis-implantation on the ovary and adrenal cortex were then examined in rats and mice (1936-1940). He obtained the degree of D. Sc. in 1936, and became an associate professor in 1938. At this time, he used not only rats but also other species of animals for experiments. He examined changes in the kidney and genital tract after removal of gonads and hypophysis in the snake, *Natrix tigrina tigrina*. He also studied the relationship between gonads and sex character in the isopod crustacean, *Armadillidium vulgare* and hormonal control of the molting in the canary in cooperation with Hideshi Kobayashi (1941-1947). Takewaki became professor in 1947. As the 1940's were a severely difficult period for scientists in Japan, it was inevitable for Takewaki to reduce his work on mammals. After 1949, however, he again took up enthusiastically his studies in rats and mice, especially on the relationship between gonads and hypophysis. During this period of his research renaissance, he spent several months (in 1954) in Prof. C. R. Moore's laboratory at University of Chicago. In 1955-1961, his interests were concentrated on the negative and positive feedback mechanisms between hypothalamo-hypophyseal and gonadal systems. For elucidation of these mechanisms he examined changes in intrasplenic ovarian grafts in gonadectomized rats. Neonatal treatments of rats with steroid hormones were carried out in connection with the study of sex differentiation. In cooperation with his associates, he also studied the relationship between gonads and adrenals in rats, the actions of sinus gland hormones in shrimps, and the hypophyseal control of reproductive functions in fishes.

The Third International Symposium on Comparative Endocrinology was held from June 5 to 11 in 1961 at Oiso, Japan. As the chairman of the international organizing committee, Takewaki led this symposium to a highly successful conclusion, resulting in an immeasurably strong impact on young zoologists studying the general and comparative endocrinology in Japan, especially since this symposium was one of the earliest international meetings held in Japan after the war.

In 1962-1965, he studied the permanent alteration of hypothalamo-hypophysio-gonadal system in persistent-estrous or -diestrous rats treated neonatally with sex hormones. He also worked on the genesis and nature of testicular tumors in rats.

Thus, Takewaki succeeded in advancing the experimental endocrinology he had inherited from Yatsu, contributing greatly to our understanding of the hormonal control of structure and function of

reproductive organs. He also carried out comparative studies of reproductive phenomena in several animal species, laying the stage for the later flourishing of comparative endocrinology in Japan.

Takewaki was a man of action. Until 70 years of age, he came to the laboratory before 8 a.m. every day, even on Sundays, and began his day by taking care of his animals. His speed of lecturing was very fast in order to convey as much knowledge as possible to students in a limited amount of time. He also rapidly reviewed the many manuscripts sent to him by investigators.

Takewaki retired from the University of Tokyo in 1965, but never wanted to spend his days in retirement from research. He continued his studies of sex phenomena in rats for the next five years, as professor at Tokyo Women's University. In 1970, he was invited to be a professor at Kawasaki Medical College in Kurashiki City, Okayama Prefecture, where he worked energetically with Dr. Yasuhiko Ohta, mainly on the uterine response to hormones under various physiological conditions in rats. He was elected a member of the Japan Academy in 1975, and expended great efforts in editing its Proceedings to the last. After he retired from the Medical College in 1976, he came back to Tokyo, and enjoyed travelling, reviewing papers, appreciating various works of art, giving lectures at Atomi Women's University (as a part-time lecturer), collecting insects around his cottage near Mt. Kurohime, Nagano Prefecture, for the rest of his life.

Thus, Professor Kiyoshi Takewaki continued his efforts as an investigator until the end of his active life. His academic publications totalled more than 200, and his students and followers more than 50. He was a rather reserved professor, who provided a powerful stimulating influence on the research activity of his students by his deeds rather than by his words.

We can expect that Kiyoshi Takewaki's unflagging pioneer's spirit that originated with Yatsu will continue to be sustained by the many zoologists who follow him.

NOBORU TAKASUGI

Department of Biology
Yokohama City University